



## PATENT ABSTRACTS OF JAPAN

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## (57)Abstract:

**PURPOSE:** To increase productivity and to improve energy efficiency by driving a piezoelectric vibrator at low voltage by a method wherein a thin film vibrator and an electrode for impressing an electric field to the thin film vibrator are alternately formed on a support material.

**CONSTITUTION:** Block formed cross designating electrodes 11 which are alternately formed so as to put a thin film vibrator 1 between the electrodes are provided, the electrode 11a is taken as a + electrode, and the electrode 11b is taken as a - electrode. When a thickness of the thin film vibrator 1 and the electrodes 11a, 11b is approximate 20 $\mu$ m, and voltage to be impressed to the vibrator is 20 to 30V, contraction in a direction 18 is obtained to the same extend as a rectangular piezoelectric ceramic vibrator which is driven by hundreds V. Further, since the electrodes are in a cross designating state, a vibration mode

wherein a direction 20 of an electric field conforms to an elastic direction 18 can be utilized. Then, an electric mechanical coupling index is large, and conversion efficiency from added electric energy to mechanical energy is improved.

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